# CERTIFICATION OF TRANSLATION

I, ***Sohee Kim***, an employee of Y.P.LEE, MOCK & PARTNERS of Koryo Bldg., 1575-1 Seocho-dong, Seocho-gu, Seoul, Republic of Korea, hereby declare under penalty of perjury that I understand the Korean language and the English language; that I am fully capable of translating from Korean to English and vice versa; and that, to the best of my knowledge and belief, the statement in the English language in the attached translation of ***Korean Patent Application No. 10-2003-0006286*** consisting of *47* pages, have the same meanings as the statements in the Korean language in the original document, a copy of which I have examined.

Signed this 10th day of August 2007

Sohee Kim

# ABSTRACT

[Abstract of the Disclosure]

Provided is a reproduction-only optical information storage medium including a lead-in area, a user data area, and a lead-out area, wherein the lead-in area includes: a first area for storing disc-related information, the disc-related information comprising information about the type of storage medium, information about the number of recording layers, and information about a disc size; a second area having a different track pitch from the first area; and a transition area included in the first and second areas, connecting the first and second areas to each other.

Accordingly, data is smoothly reproduced from the reproduction-only optical information storage medium at a low error generation rate. Also, since the optical information storage medium provides standards for the transition area, it is compatible with existing optical information storage media.

[Representative Drawing]

FIG. 2A

# SPECIFICATION

[Title of the Invention]

Optical information storage medium

[Brief Description of the Drawings]

FIG. 1 shows a physical structure of a reproduction-only optical information storage medium;

FIG. 2A through 2E show examples of a pit pattern for a transition area between a burst cutting area (BCA) and a lead-in area of an optical information storage medium according to a first embodiment of the present invention when pits for the BCA are formed in a single pattern and pits for the lead-in area are formed in a straight random pattern;

FIGS. 3A through 3E show examples of a pit pattern for a transition area between the BCA and the lead-in area of the optical information storage medium according to the first embodiment of the present invention when pits for the BCA are formed in a specific pattern and pits for the lead-in area are formed in a straight random pattern;

FIGS. 4A through 4E show examples of a pit pattern for a transition area between the BCA and the lead-in area of the optical information storage medium according to the first embodiment of the present invention when pits for the BCA are formed in a random pattern and pits for the lead-in area are formed in a straight random pattern;

FIGS. 5A through 5E show examples of a pit pattern for a transition area between the BCA and the lead-in area of the optical information storage medium according to the first embodiment of the present invention when pits for the BCA are formed in a single pattern and pits for the lead-in area are formed in a wobbling random pattern;

FIGS. 6A through 6E show examples of a pit pattern for a transition area between the BCA and the lead-in area of the optical information storage medium according to the first embodiment of the present invention when pits for the BCA are formed in a specific pattern and pits for the lead-in area are formed in a wobbling random pattern;

FIGS. 7A through 7F show examples of a pit pattern for a transition area between the BCA and the lead-in area of the optical information storage medium according to the first embodiment of the present invention when pits for the BCA are formed in a random pattern and pits for the lead-in area are formed in a wobbling random pattern;

FIGS. 8A through 8F show examples of a pit pattern for a transition area between a lead-in area and a user data area of an optical information storage medium according to a second embodiment of the present invention when pits for the lead-in area are formed in a straight random pattern and pits for the user data area are formed in a straight random pattern;

FIGS. 9A through 9F show a pit pattern for a transition area between the lead-in area and the user data area of the optical information storage medium according to the second embodiment of the present invention when pits for the lead-in area are formed in a wobbling random pattern and pits for the user data area are formed in a straight random pattern;

FIGS. 10A through 10F show examples of a pit pattern for a transition area between the lead-in area and the user data area of the optical information storage medium according to the second embodiment of the present invention when pits for the lead-in area are formed in a straight random pattern and pits for the user data area are formed in a wobbling random pattern;

FIG. 11 shows a physical structure of an optical information storage medium according to a third embodiment of the present invention; and

FIGS. 12A through 12F show examples of a pit pattern for a transition area between a BCA and a lead-in area of the optical information storage medium according to the third embodiment of the present invention when pits for a first area of the lead-in area are formed in a random pattern and pits for a second area of the lead-in area are formed in a wobbling random pattern.

< Explanation of Reference numerals designating the Major Elements of the Drawings >

| | |
|---|---|
| 10… BCA | 15, 25, 27… transition areas |
| 20… lead-in area | 30… user data area |
| 40… lead-out area | |

[Detailed Description of the Invention]

[Object of the Invention]

[Technical Field of the Invention and Related Art prior to the Invention]

The present invention relates to a reproduction-only information storage medium, and more particularly, to an optical information storage medium including a transition area for transiting between two adjacent areas among the areas forming the storage medium.

Optical information storage media, for example, optical disks, are widely used in optical pickup apparatuses for recording/reproducing information in a non-contact way. Optical disks are classified as compact disks (CDs) or digital versatile disks (DVDs) according to their information storage capacity. Examples of recordable optical disks are 650MB CD-R, CD-RW, 4.7GB DVD+RW, and the like. Furthermore, HD-DVDs having a recording capacity of 20GB or greater are under development.

The compatibility of the above optical information storage media with one another contributes to the convenience of users. In consideration of the economical efficiency and the convenience of users, storage media have different standards for different types. Storage media that have no determined standards yet are under standardization. To achieve this standardization, a storage medium must be developed that gas a format that can guarantee compatibility and consistency with existing storage media.

As shown in FIG. 1, a conventional reproduction-only optical disk includes a burst cutting area (BCA) 10, a lead-in area 20, a user data area 30, and a lead-out area 40. The BCA 10 stores information about the serial number of the optical disk, and the lead-in area 20 stores disk-related information. Here, the serial number of the optical disk is recorded as a barcode.

The BCA 10, the lead-in area 20, the user data area 30, and the lead-out area 40 are consecutively arranged with no transition areas between adjacent areas. However, when the BCA 10, the lead-in area 20, and the user data area 30 have different pit patterns, consecutive data reproduction may not be properly performed because of the absence of transition areas.

[Technical Goal of the Invention]

The present invention provides an optical information storage medium which includes a plurality of areas and a transition area between two adjacent areas so as to achieve smooth data reproduction.

[Structure and Operation of the Invention]

According to an aspect of the present invention, there is provided a reproduction-only optical information storage medium including a plurality of areas. A transition area is included in at least one of areas formed between two adjacent areas.

Data is recorded in the form of pits in the areas and the transition area.

Preferably, a pit pattern of the transition area is the same as a pit pattern of an area in front of the transition area or as a pit pattern of an area at rear of the transition area.

The transition area is a mirror area.

Pits of the transition area are formed in a straight pattern or a wobbling pattern.

A track pitch of pits for the transition area is the same as track pitches of pits for two areas between which the transition area is included. Alternatively, the track pitch of pits for the transition area and the track pitches of pits for two areas between which the transition area is included are different. Preferably, the track pitch of pits formed in the transition area gradually increases or decreases from the track pitch of pits formed in one area in front of the transition area to the track pitch of pits formed in the other area at rear of the transition area.

According to another aspect of the present invention, there is provided a reproduction-only optical information storage medium including a burst cutting area (BCA), a lead-in area, a user data area, and a lead-out area, each of which is formed of pits. A transition area is included in at least one of an area between the BCA and the lead-in area, an area between the lead-in area and the user data area, and an area between the user data area and the lead-out area.

A first transition area is included between the BCA and the lead-in area, and the BCA, the lead-in area, and the first transition area are each formed of pits to have a straight or wobbling pattern.

A second transition area is included between the lead-in area and the user data area, and the lead-in area, the user data area, and the second transition area are each formed of pits to have a straight or wobbling pattern.

Preferably, when pits for the first or second transition area is formed in a wobbling pattern, the amplitude of a wobble gradually decreases or increases.

According to still another aspect of the present invention, there is provided a reproduction-only optical information storage medium including a burst cutting area (BCA), a lead-in area, a user data area, and a lead-in area, each of which is formed of pits. At least one of the BCA, the lead-in area, the user data area, and the lead-out area is divided into a plurality of sub-areas, and a transition area is included in an area between two adjacent sub-areas.

Preferred embodiments of the present invention will now be described with reference to the attached drawings.

An optical information storage medium according to the present invention is reproduction-only, and the entire area thereof is formed of pits. The optical information storage medium according to the present invention can be divided into a plurality of areas according to function. As shown in FIG. 1, the optical information storage medium according to the present invention includes a burst cutting area (BCA) 10, a lead-in area 20, a user data area 30 for storing user data, and a lead-out area 40, which are sequentially formed from the inner boundary to the outer boundary of the optical information storage medium.

The BCA 10 stores the serial number of an optical information storage medium, for example, an optical disk, or data identifying the BCA. The lead-in area 20 stores disk-related information, copy protection information, and the like. Examples of the disk-related information are information about the type of information storage medium, such as a recordable disk, a write-one disk, or a reproduction-only disk, information about the number of recording layers, information about a recording speed, information about the disk size, and the like.

Referring to FIG. 2A through 2F, an optical information storage medium according to a first embodiment of the present invention includes a first transition zone 15 between the BCA 10 and the lea-in area 20.

The BCA 10 stores data recorded in a first straight pit pattern. The lead-in area 20 stores data that may be recorded in a second straight pit pattern, which is different from the first straight pit pattern, or in a wobbling pit pattern. Alternatively,

the BCA 10 stores data recorded in a first wobbling pit pattern, and the lead-in area 20 stores data that may be recorded in a second wobbling pit pattern, which is different from the first wobbling pit pattern, or in a straight pit pattern. A straight pit pattern denotes an arrangement of pits along a straight line, and a wobbling pit pattern denotes an arrangement of pits along a wavy line.

The first and second straight pit patterns and the first and second wobbling pit patterns may be classified as a single pattern, a specific pattern, or a random pattern. The single pattern denotes a pattern in which pits, each having an identical length (nT), are arranged at regular intervals. Here, n denotes a natural number, and T denotes the minimum length of a pit. For example, a straight single pit pattern denotes a pattern in which pits each having an identical length are arranged along a straight line. A wobbling single pit pattern denotes a pattern in which pits each having an identical length are arranged along a wavy line. The specific pattern denotes a repetition of a pattern of pits having different lengths. For example, a pattern of a 3T pit and a 6T pit repeats. A straight specific pit pattern denotes a repetition of a pattern of pits that have different lengths along a straight line. A wobbling specific pit pattern denotes a repetition of a pattern of pits with different lengths along a wavy line. The random pattern denotes a random arrangement of pits having different lengths. For example, a straight random pit pattern denotes a random arrangement of pits with different lengths along a straight line. A wobbling random pit pattern denotes a random arrangement of pits with different lengths along a wavy line.

Because the BCA 10 and the lead-in area 20 have different pit patterns, the first transition area 15 is included between the BCA 10 and the lead-in area 20 in order to prepare against an improper consecutive reproduction of data. The first transition area 15 stores data identifying a transition area.

FIG. 2A through 2E show examples of a pit pattern for the first transition area 15 when the BCA 10 is formed of pits in a straight single pattern and the lead-in area 20 is formed of pits in a straight random pattern. As shown in FIG. 2A, data is recorded in the BCA 10 in the form of a straight single pattern of pits, data is recorded in the lead-in area 20 in the form of a straight random pattern of pits, and the first transition area 15 between the BCA 10 and the lead-in area 20 is formed of a straight single pattern of pits. Although not shown, the first transition area 15 may be formed of a wobbling single pattern of pits.

As shown in FIG. 2B, data is recorded in the BCA 10 in the form of a straight single pattern of pits, data is recorded in the lead-in area 20 in the form of a straight random pattern of pits, and the first transition area 15 between the BCA 10 and the lead-in area 20 is formed of a straight random pattern of pits. Although not shown, the first transition area 15 may be formed of a wobbling random pattern of pits.

As shown in FIG. 2C, data is recorded in the BCA 10 in the form of a straight single pattern of pits, data is recorded in the lead-in area 20 in the form of a straight random pattern of pits, and the first transition area 15 between the BCA 10 and the lead-in area 20 is a mirror area.

As shown in FIG. 2D, data is recorded in the BCA 10 in the form of a straight single pattern of pits, data is recorded in the lead-in area 20 in the form of a straight random pattern of pits, and the first transition area 15 between the BCA 10 and the lead-in area 20 is formed of a straight specific pattern of pits.

Alternatively, the first transition area 15 may be formed of a wobbling single pattern of pits, a wobbling random pattern of pits, or a wobbling specific pattern of pits. In FIG. 2E, the first transition area 15 is formed of a wobbling random pattern of pits.

Although FIGS. 2A through 2E show the BCA 10 formed of a straight single pattern of pits, the BCA 10 may be formed of a wobbling single pattern of pits.

FIGS. 3A through 3E show examples of a pit pattern for the first transition area 15 between the BCA 10 and the lead-in area 20 when the BCA 10 is formed of a straight specific pattern of pits and the lead-in area 20 is formed of a straight random pattern of pits. Referring to FIG. 3A, the first transition area 15 is formed of a straight single pattern of pits. Referring to FIG. 3B, the first transition area 15 is formed of a straight random pattern of pits. Referring to FIG. 3C, the first transition area 15 is a mirror area. Referring to FIG. 3D, the first transition area 15 is formed of a straight specific pattern of pits. Alternatively, the first transition area 15 may be formed of a wobbling single pattern of pits, a wobbling random pattern of pits, or a wobbling specific pattern of pits. Referring to FIG. 3E, the first transition area 15 is formed of a wobbling random pattern of pits. Alternatively, the first transition area 15 may be formed of a wobbling single pattern of pits, a wobbling random pattern of pits, or a wobbling specific pattern of pits.

FIGS. 4A through 4E show examples of a pit pattern formed in the first transition area 15 between the BCA 10 and the lead-in area 20 when pits are formed

in the BCA 10 in a straight random pattern and pits are formed in the lead-in area 20 in a straight random pattern. Referring to FIG. 4A, pits are formed in the first transition area 15 in a straight single pattern. Referring to FIG. 4B, pits are formed in the first transition area 15 in a straight random pattern. Referring to FIG. 4C, the first transition area 15 is a mirror area. Referring to FIG. 4D, pits are formed in the first transition area 15 in a straight specific pattern. Alternatively, pits may be formed in the first transition area 15 in a wobbling single pattern, a wobbling random pattern, or a wobbling specific pattern. Referring to FIG. 4E, the first transition area 15 is formed of a wobbling random pattern of pits. Although not shown, pits may be formed in the BCA 10 in a wobbling random pattern instead of a straight random pattern.

As described above, when pits are formed in the BCA 10 in a straight random pattern or in a wobbling random pattern, information containing a content, for example, 00h or BCA, can be recorded in the BCA 10.

Although only the case where pits are formed in the BCA 10 in a straight pattern has been described above, the BCA 10 may be formed of a wobbling pattern of pits. For example, pits may be formed in the BCA 10 in a wobbling single pattern, in a wobbling specific pattern, or in a wobbling random pattern.

There may be a case where pits are formed in the BCA 10 in a straight pattern or a wobbling pattern and pits are formed in the lead-in area 20 in a wobbling pattern.

FIGS. 5A through 5E show examples of a pit pattern formed in the first transition area 15 between the BCA 10 and the lead-in area 20 when pits are formed in the BCA 10 in a straight single pattern and pits are formed in the lead-in area 20 in a wobbling random pattern. Referring to FIG. 5A, pits are formed in the first transition area 15 in a straight single pattern. Referring to FIG. 5B, pits are formed in the first transition area 15 in a straight random pattern. Referring to FIG. 5C, the first transition area 15 is a mirror area. Referring to FIG. 5D, pits are formed in the first transition area 15 in a straight specific pattern. Alternatively, pits may be formed in the first transition area 15 in a wobbling single pattern, a wobbling random pattern, or a wobbling specific pattern. Referring to FIG. 5E, pits are formed in the first transition area 15 in a wobbling random pattern. Although FIGS. 5A through 5E show the BCA 10 where pits are formed in a straight single pattern, pits may be formed in the BCA 10 in a wobbling single pattern.

FIGS. 6A through 6E show examples of a pit pattern formed in the first transition area 15 when pits are formed in the BCA 10 in a straight specific pattern and pits are formed in the lead-in area 20 in a wobbling random pattern. Referring to FIG. 6A, pits are formed in the first transition area 15 in a straight single pattern. Referring to FIG. 6B, pits are formed in the first transition area 15 in a straight random pattern. Referring to FIG. 6C, the first transition area 15 is a mirror area. Referring to FIG. 6D, pits are formed in the first transition area 15 in a straight specific pattern. Alternatively, pits may be formed in the first transition area 15 in a wobbling single pattern, a wobbling random pattern, or a wobbling specific pattern. For example, FIG. 6E shows the first transition area 15 where pits are formed in a wobbling random pattern. Although FIGS. 6A through 6E show the BCA 10 where pits are formed in a straight single pattern, pits may be formed in the BCA 10 in a wobbling specific pattern.

FIGS. 7A through 7F show examples of a pit pattern formed in the first transition area 15 when pits are formed in the BCA 10 in a straight random pattern and pits are formed in the lead-in area 20 are formed in a wobbling random pattern. Referring to FIG. 7A, pits are formed in the first transition area 15 in a straight single pattern. Referring to FIG. 7B, pits are formed in the first transition area 15 in a straight random pattern. Referring to FIG. 7C, the first transition area 15 is a mirror area. Referring to FIG. 7D, pits are formed in the first transition area 15 in a straight specific pattern. Alternatively, pits may be formed in the first transition area 15 in a wobbling single pattern, a wobbling random pattern, or a wobbling specific pattern. For example, FIG. 7E shows the first transition area 15 where pits are formed in a wobbling random pattern. Although FIGS. 7A through 7E show the BCA 10 where pits are formed in a straight random pattern, pits may be formed in the BCA 10 in a wobbling random pattern. When pits are formed in the BCA 10 in a straight random pattern or a wobbling random pattern as described above, information containing a content, such as, 00h or BCA, can be recorded in the BCA 10.

When pits are formed in the BCA 10, the first transition area 15, or the lead-in area 20 in a wobbling pattern, they are formed so that the amplitude of a wobble gradually increases or decreases. As shown in FIG. 7F, it is preferable that pits are formed in the first transition area 15 in a wobbling pattern so that the amplitude of a wobble can gradually increase.

The BCA 10, the first transition area 15, and the lead-in area 20 may have either an identical track pitch or different track pitches. For example, the BCA 10 and the first transition area 15 have the same track pitch, and only the lead-in area 20 has a different track pitch. Alternatively, the first transition area 15 and the lead-in area 20 may have the same track pitch, and only the BCA 10 has a different track pitch. When the BCA 10 and the lead-in area 20 have different track pitches, the first transition area 15 can be formed so that its track pitch can gradually increase or decrease. For example, when a track pitch for the BCA 10 is "a" and a track pitch for the lead-in area 20 is "b" (b>a), the first transition area 15 is formed so that its track pitch can gradually increase from "a" to "b".

An optical information storage medium according to a second embodiment of the present invention includes the BCA 10, the lead-in area 20, the user data area 30, and the lead-out area 40. A second transition area 25 is further included between the lead-in area 20 and the user data area 30.

Hereinafter, a pit pattern formed in each of the lead-in area 20, the second transition area 25, and the user data area 30 will be described with reference to FIGS. 8A through 10F. When pits are formed in the lead-in area 20 in a third straight pattern and pits are formed in the user data area 30 in a fourth straight pattern, the second transition area 25 can be formed of a straight single pattern of pits, a straight specific pattern of pits, a straight random pattern of pits, a wobbling single pattern of pits, a wobbling specific pattern of pits, or a wobbling random pattern of pits. Alternatively, the second transition area 25 can be a mirror area.

Each of the third and fourth straight patterns may be one of the straight single pattern, the straight specific pattern, and the straight random pattern.

FIGS. 8A through 8F show examples of a pit pattern formed in the second transition area 25 when pits are formed in the lead-in area 20 in a straight random pattern and pits are formed in the user data area 30 in a straight random pattern. Referring to FIG. 8A, pits are formed in the second transition area 25 in a straight single pattern. Referring to FIG. 8B, pits are formed in the second transition area 25 in a straight random pattern. Referring to FIG. 8C, the second transition area 25 is a mirror area. Referring to FIG. 8D, pits are formed in the second transition area 25 in a straight specific pattern. Alternatively, pits may be formed in the second transition area 25 in a wobbling single pattern, a wobbling random pattern, or a

wobbling specific pattern. For example, FIG. 8E shows the second transition area 25 where pits are formed in a wobbling random pattern.

When pits are formed in the second transition area 25 in a wobbling pattern, they are preferably formed so that the amplitude of a wobble can gradually decrease as shown in FIG. 8F.

A pit pattern formed in the second transition area 25 when the lead-in area 25 is formed of a wobbling pattern of pits and the user data area 30 is formed of a straight pattern of pits will now be described. To be more specific, pits may be formed in the lead-in area 20 in a wobbling single pattern, a wobbling specific pattern, or a wobbling random pattern, and pits may be formed in the user data area 30 in a straight single pattern, a straight specific pattern, or a straight random pattern.

FIGS. 9A through 9F show examples of a pit pattern formed in the second transition area 25 when the lead-in area 20 and the user data area 30 are formed of pits to have a wobbling random pattern and a straight random pattern, respectively. Referring to FIG. 9A, pits are formed in the second transition area 25 in a straight single pattern. Referring to FIG. 9B, pits are formed in the second transition area 25 in a straight random pattern. Referring to FIG. 9C, the second transition area 25 is a mirror area. Referring to FIG. 9D, pits are formed in the second transition area 25 in a straight specific pattern. Alternatively, pits may be formed in the second transition area 25 in a wobbling single pattern, a wobbling random pattern, or a wobbling specific pattern. For example, FIG. 9E shows the second transition area 25 where pits are formed in a wobbling random pattern.

When pits are formed in the second transition area 25 in a wobbling pattern, they are preferably formed so that the amplitude of a wobble can gradually decrease as shown in FIG. 9F.

Examples of a pit pattern formed in the second transition area 25 when the lead-in area 20 and the user data area 30 are formed of a straight pattern of pits and a wobbling pattern of pits, respectively, will now be described. To be more specific, pits may be formed in the lead-in area 20 in a straight single pattern, a straight specific pattern, or a straight random pattern, and pits may be formed in the user data area 30 in a wobbling single pattern, a wobbling specific pattern, or a wobbling random pattern.

FIGS. 10A through 10F show examples of a pit pattern formed in the second transition area 25 when the lead-in area 20 and the user data area 30 are formed of

pits to have a straight random pattern and a wobbling random pattern, respectively. Referring to FIG. 10A, pits are formed in the second transition area 25 in a straight single pattern. Referring to FIG. 10B, pits are formed in the second transition area 25 in a straight random pattern. Referring to FIG. 10C, the second transition area 25 is a mirror area. Referring to FIG. 10D, pits are formed in the second transition area 25 in a straight specific pattern. Alternatively, pits may be formed in the second transition area 25 in a wobbling single pattern, a wobbling random pattern, or a wobbling specific pattern. For example, FIG. 10E shows the second transition area 25 where pits are formed in a wobbling random pattern.

When pits are formed in the second transition area 25 in a wobbling pattern, they are preferably formed so that the amplitude of a wobble can gradually increase as shown in FIG. 10F.

When the lead-in area 20 and the user data area 30 are formed of pits to have a wobbling pattern, the second transition area 25 included therebetween can be formed of a straight single pattern of pits, a straight specific pattern of pits, a straight random pattern of pits, a wobbling single pattern of pits, a wobbling specific pattern of pits, or a wobbling random pattern of pits. Alternatively, the second transition area 25 can be a mirror area.

When pits are formed in the lead-in area 20, the second transition area 25, or the user data area 30 in a wobbling pattern, they can be formed so that the amplitude of a wobble gradually increases or decreases.

The lead-in area 20, the second transition area 25, and the user data area 30 may have either an identical track pitch or different track pitches. For example, the lead-in area 20 and the second transition area 25 have the same track pitch, and only the user data area 30 has a different track pitch. Alternatively, the second transition area 25 and the user data area 30 may have the same track pitch, and only the lead-in area 20 has a different track pitch. When the lead-in area 20 and the user data area 30 have different track pitches, the second transition area 25 can be formed so that its track pitch can gradually increase or decrease. For example, when a track pitch for the lead-in area 20 is "c" and a track pitch for the user data area 30 is "d" (d>c), the second transition area 25 is formed so that its track pitch can gradually increase from "c" to "d".

An optical information storage medium according to a third embodiment of the present invention is divided into a plurality of areas, at least one of which is divided

into a plurality of sub-areas according to function. A third transition area is included between two adjacent sub-areas. Referring to FIG. 11, the optical information storage medium according to the third embodiment of the present invention includes the BCA 10, the lead-in area 20, the user data area 30, and the lead-out area 40. The lead-in area 20 includes first and second sub-areas 20a and 20b.

A transition area may be included both between the BCA 10 and the lead-in area 20 and between the lead-in area 20 and the user data area 30. The principle of the first and second transition areas of the first and second embodiments is equally applied to these transition areas.

A third transition area is included between the first and second sub-areas 20a and 20b of the lead-in area 20. Hereinafter, a pit pattern formed in each of the first and second sub-areas 20a and 20b and the third transition area will be described in greater detail. The first and second sub-areas 20a and 20b are formed of pits in a straight pattern and a wobbling pattern, respectively. The straight pattern may be a straight single pattern, a straight specific pattern, or a straight random pattern, and the wobbling pattern may be a wobbling single pattern, a wobbling specific pattern, or a wobbling random pattern.

A third transition area 27 formed between the first and second sub-areas 20a and 20b when the first and second sub-areas 20a and 20b are formed of pits to have a straight pattern and a wobbling patter, respectively, will now be described.

FIGS. 12A through 12F show examples of a pit pattern for the third transition area 27 when the first and second sub-areas 20a and 20b are formed of pits to have a straight random pattern and a wobbling random pattern, respectively. Referring to FIG. 12A, pits are formed in the third transition area 27 in a straight single pattern. Referring to FIG. 12B, pits are formed in the third transition area 27 in a straight random pattern. Referring to FIG. 12C, the third transition area 27 is a mirror area. Referring to FIG. 12D, pits are formed in the third transition area 27 in a straight specific pattern. Alternatively, pits may be formed in the third transition area 27 in a wobbling single pattern, a wobbling random pattern, or a wobbling specific pattern. For example, FIG. 12E shows the third transition area 27 where pits are formed in a wobbling random pattern. When pits are formed in the third transition area 27 in a wobbling pattern, they are preferably formed so that the amplitude of a wobble can gradually increase or decrease. For example, it is preferable that the third transition

area 27 is formed of a wobbling random pattern of pits so that the amplitude of a wobble can gradually increase as shown in FIG. 12F.

When the first and second sub-areas 20a and 20b are formed of pits to have a wobbling pattern and a straight pattern, respectively, the third transition area 27 included therebetween may be formed of a straight single pattern of pits, a straight specific pattern of pits, a straight random pattern of pits, a wobbling single pattern of pits, a wobbling specific pattern of pits, or a wobbling random pattern of pits. Alternatively, the third transition area 27 may be a mirror area.

When the first and second sub-areas 20a and 20b are both formed of pits to have a straight pattern, the third transition area 27 included therebetween may be formed of a straight single pattern of pits, a straight specific pattern of pits, a straight random pattern of pits, a wobbling single pattern of pits, a wobbling specific pattern of pits, or a wobbling random pattern of pits. Alternatively, the third transition area 27 may be a mirror area.

When the first and second sub-areas 20a and 20b are both formed of pits to have a wobbling pattern, the third transition area 27 included therebetween may be formed of a straight single pattern of pits, a straight specific pattern of pits, a straight random pattern of pits, a wobbling single pattern of pits, a wobbling specific pattern of pits, or a wobbling random pattern of pits. Alternatively, the third transition area 27 may be a mirror area.

When pits are formed in the first and second sub-areas 20a and 20b and the third transition area 27 in a wobbling pattern, they may be formed so that the amplitude of a wobble gradually increases or decreases.

The case where only the lead-in area 20 is divided into two sub-areas has been described above. However, the BCA 10, the user data area 30, or the lead-out area 40 may also be divided into a plurality sub-areas. In this case, a transition area may be formed between two adjacent sub-areas.

The first and second sub-areas 20a and 20b and the third transition area 27 may have either an identical track pitch or different track pitches. For example, the first sub-area 20a and the third transition area 27 have the same track pitch, and only the second sub-area 20b has a different track pitch. Alternatively, the third transition area 27 and the second sub-area 20b have the same track pitch, and only the first sub-area 20a has a different track pitch. When the first and second sub-areas 20a and 20b have different track pitches, the third transition area 27 may

be formed so that its track pitch can gradually increase or decrease. For example, when a track pitch for the first sub-area 20a is "e" and a track pitch for the second sub-area 20b is "f" (f>e), the third transition area 27 is formed so that its track pitch can gradually increase from "e" to "f".

As described above, an optical information storage medium according to the present invention includes a plurality of areas, and a transition area is included in at least one of boundary areas formed by the areas. For example, a transition area is included in at least one of an area between the BCA 10 and the lead-in area 20, an area between the lead-in area 20 and the user data area 30, and an area between the first and second sub-areas 20a and 20b. A pit pattern formed in the transition area may be the same as that formed in the area that is in front of or at rear of the transition area. The area in front of the transition area denotes an area that is closer to the center of the storage medium than the transition area. The area at rear of the transition area denotes an area that is more outside than the transition area in the radial direction of the storage medium.

The optical information storage medium according to the present invention may be constituted with a single layer or a plurality of layers.

[Effect of the Invention]

As described above, the optical information storage medium according to the present invention is divided into a plurality of areas according to function or purpose, and a transition area is included between two adjacent areas. Thus, data is smoothly reproduced at a low error generation rate. Also, since the optical information storage medium according to the present invention provides standards for the transition area, it is compatible with existing optical information storage media.

What is claimed is:

1. An optical information storage medium comprising:

a lead-in area;

a user data area; and

a lead-out area,

wherein the lead-in area comprises:

a first area for storing disc-related information, the disc-related information comprising information about the type of storage medium, information about the number of recording layers, and information about a disc size;

a second area having a different track pitch from the first area; and

a transition area included in the first and second areas, connecting the first and second areas to each other.

2. The optical information storage medium of claim 1, wherein data is recorded in the form of pits in the areas and the transition area.

3. The optical information storage medium of claim 2, wherein a pit pattern of the transition area is the same as a pit pattern of an area in front of the transition area.

4. The optical information storage medium of claim 2, wherein a pit pattern of the transition area is the same as a pit pattern of an area at rear of the transition area.

6. The optical information storage medium of one of claims 1 through 4, wherein pits of the transition area are formed in a straight pattern or a wobbling pattern.

7. The optical information storage medium of claim 6, wherein the straight pattern is one of a straight single pattern, a straight specific pattern, and a straight random pattern.

8. The optical information storage medium of claim 6, wherein the wobbling pattern is one of a wobbling single pattern, a wobbling specific pattern, and a wobbling random pattern.

9. The optical information storage medium of one of claims 1 through 4, wherein a track pitch of pits for the transition area is the same as a track pitch of pits for the first area.

10. The optical information storage medium of one of claims 1 through 4, wherein a track pitch of pits for the transition area is the same as a track pitch of pits for the second area.

11. The optical information storage medium of one of claims 1 through 4, wherein the track pitch of pits formed in the transition area gradually increases or decreases from the track pitch of pits formed in one area in front of the transition area to the track pitch of pits formed in the other area at rear of the transition area.

12. The optical information storage medium of claim 6, wherein when pits for the transition area is formed in a wobbling pattern, the amplitude of a wobble gradually decreases or increases.

13. The optical information storage medium of one of claims 1 through 4, wherein the transition area stores information identifying a transition area.

FIG. 1

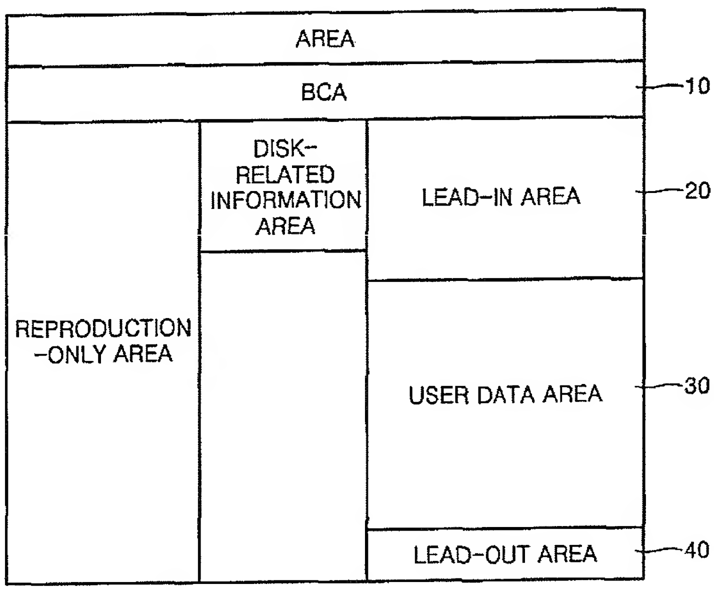
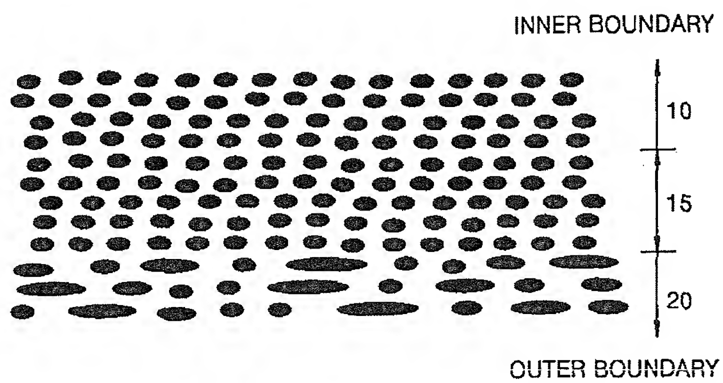

AREA
BCA
10
REPRODUCTION
-ONLY AREA
DISK-
RELATED
INFORMATION
AREA
LEAD-IN AREA
20
USER DATA AREA
30
LEAD-OUT AREA
40

FIG. 2A


INNER BOUNDARY
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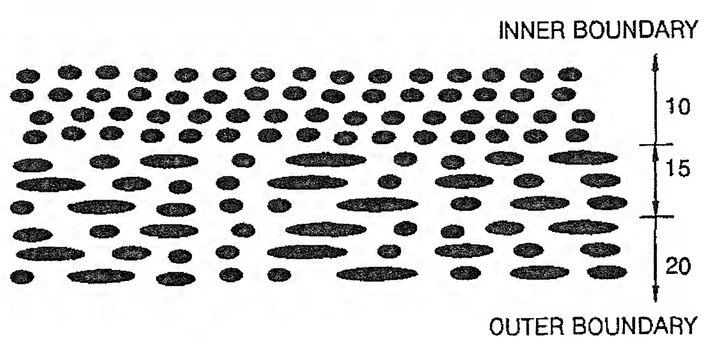
OUTER BOUNDARY

FIG. 2B


INNER BOUNDARY
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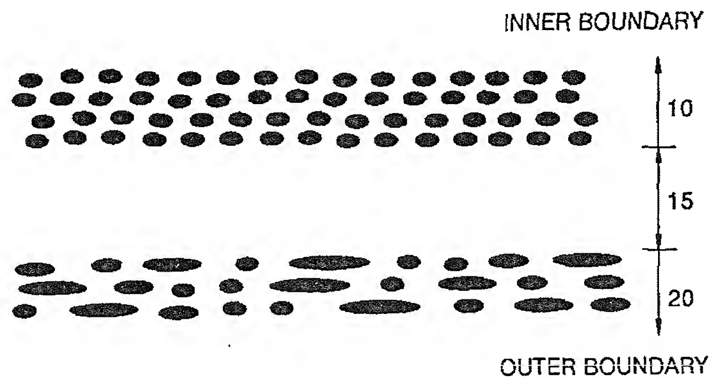
OUTER BOUNDARY

FIG. 2C


INNER BOUNDARY
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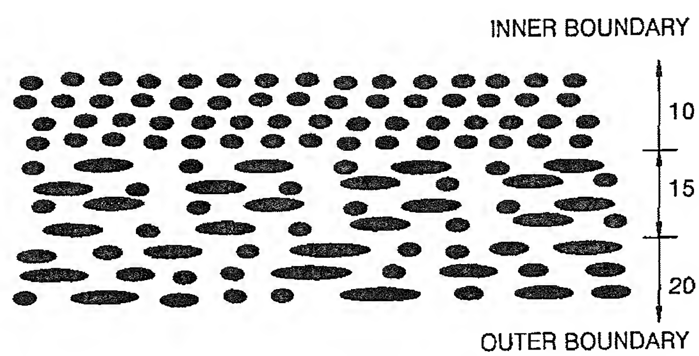
OUTER BOUNDARY

FIG. 2D


INNER BOUNDARY
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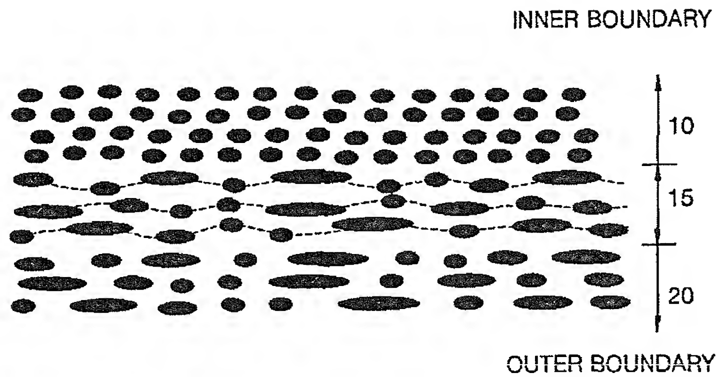
OUTER BOUNDARY

FIG. 2E


INNER BOUNDARY
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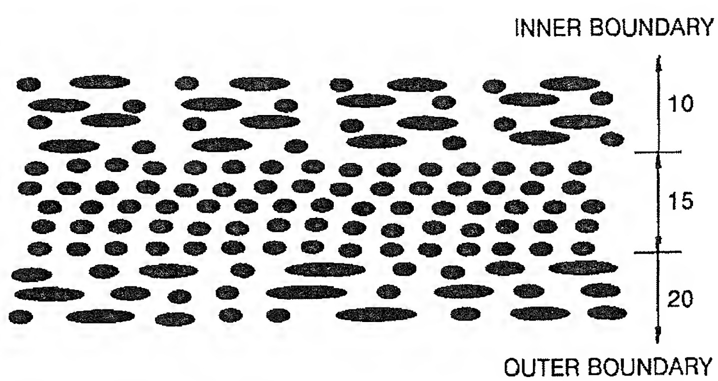
OUTER BOUNDARY

FIG. 3A


INNER BOUNDARY
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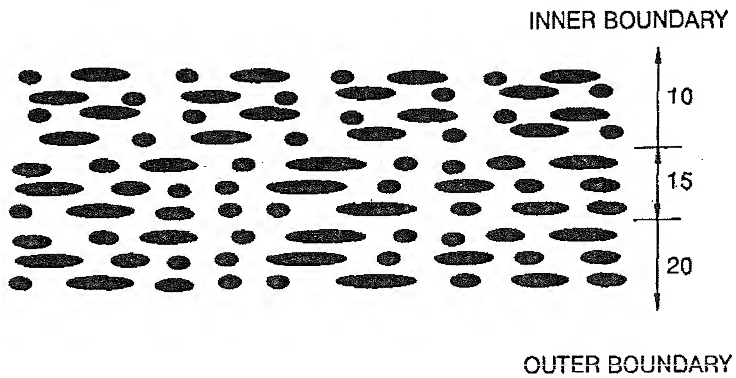
OUTER BOUNDARY

FIG. 3B


INNER BOUNDARY
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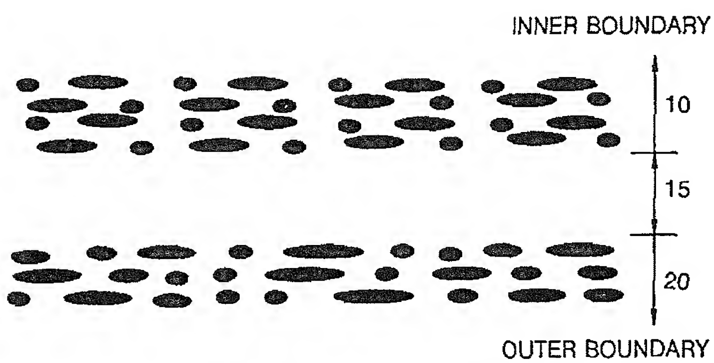
OUTER BOUNDARY

FIG. 3C


INNER BOUNDARY
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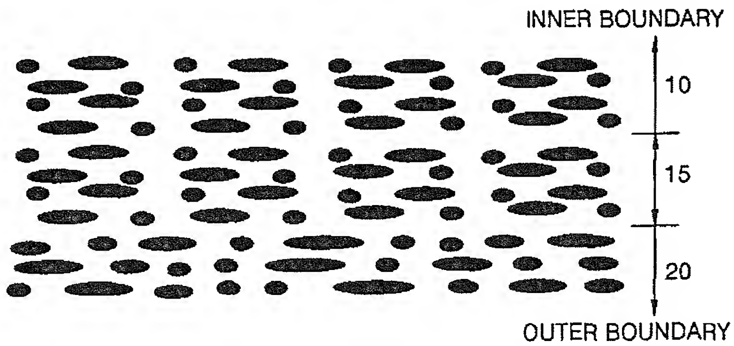
OUTER BOUNDARY

FIG. 3D



INNER BOUNDARY
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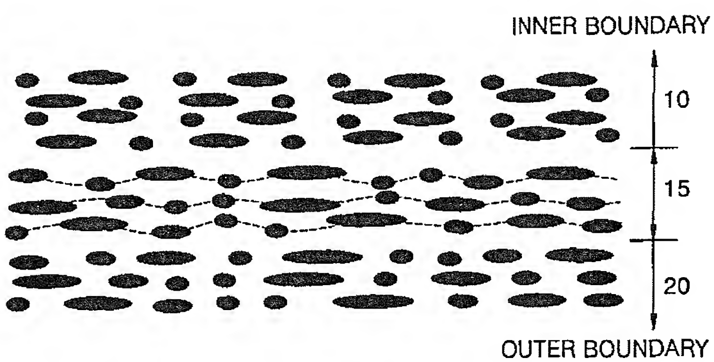
OUTER BOUNDARY


FIG. 3E



INNER BOUNDARY
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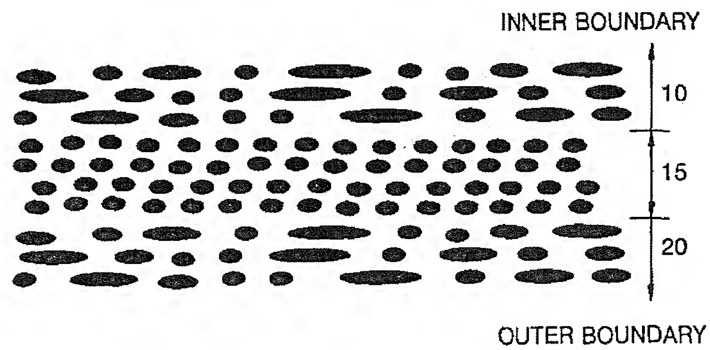
OUTER BOUNDARY

FIG. 4A


INNER BOUNDARY
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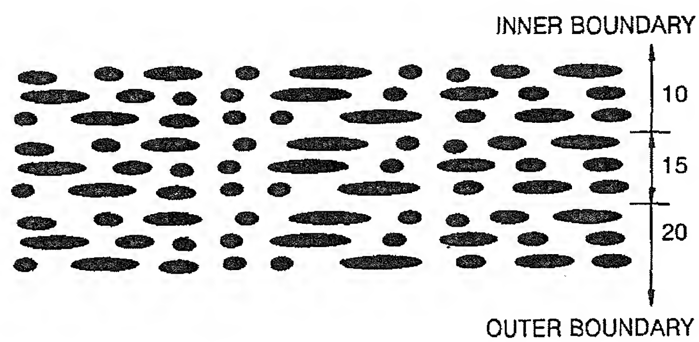
OUTER BOUNDARY

FIG. 4B


INNER BOUNDARY
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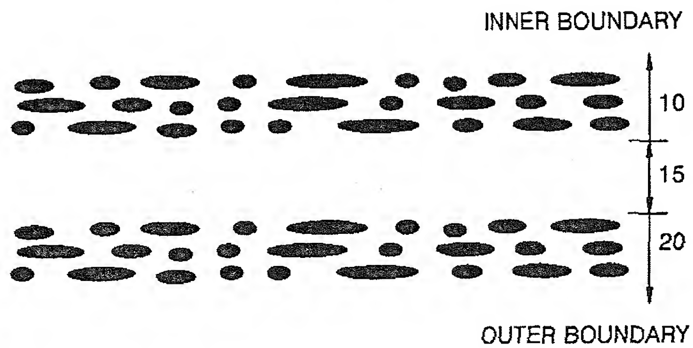
OUTER BOUNDARY

FIG. 4C


INNER BOUNDARY
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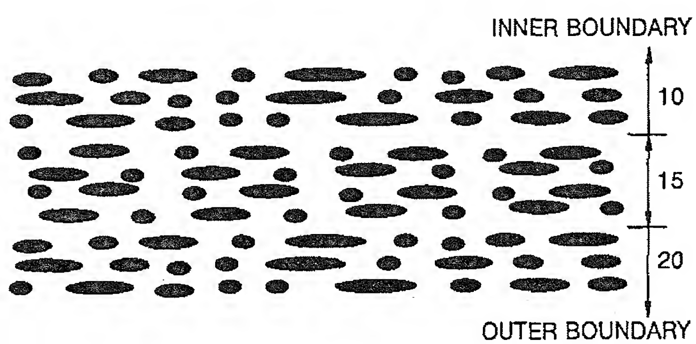
OUTER BOUNDARY

FIG. 4D


INNER BOUNDARY
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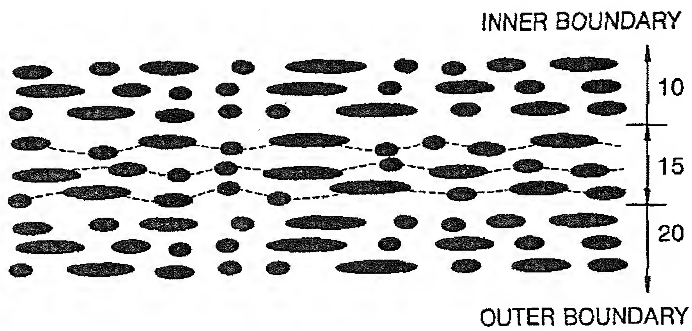
OUTER BOUNDARY

FIG. 4E


INNER BOUNDARY
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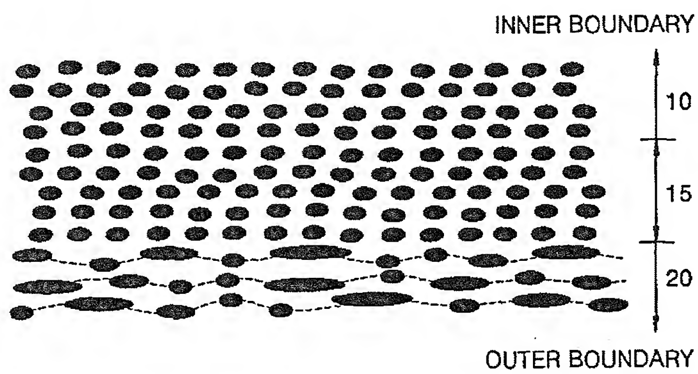
OUTER BOUNDARY

FIG. 5A


INNER BOUNDARY
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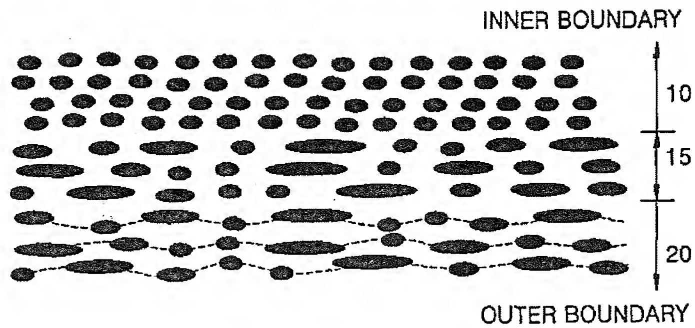
OUTER BOUNDARY

FIG. 5B


INNER BOUNDARY
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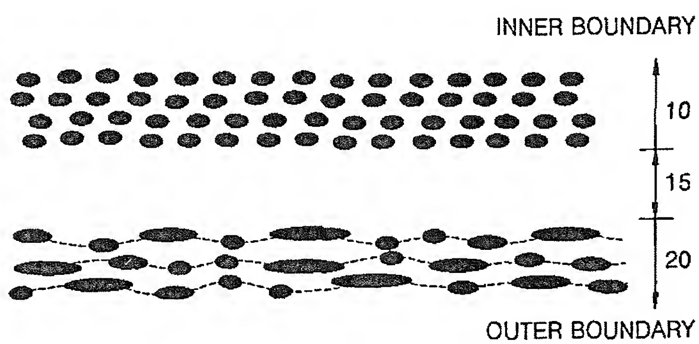
OUTER BOUNDARY

FIG. 5C


INNER BOUNDARY
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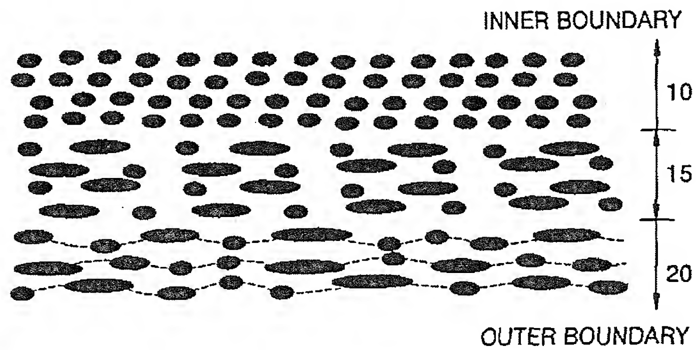
OUTER BOUNDARY

FIG. 5D


INNER BOUNDARY
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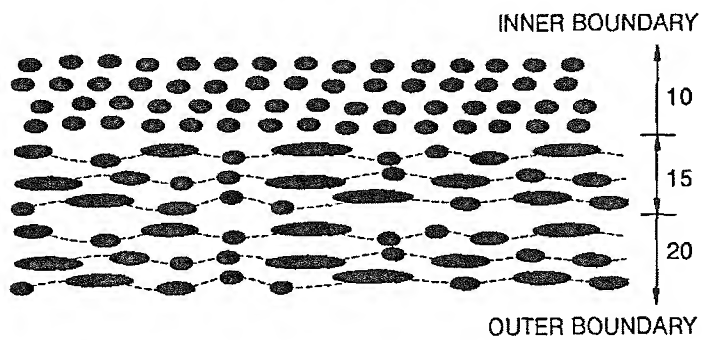
OUTER BOUNDARY

FIG. 5E


INNER BOUNDARY
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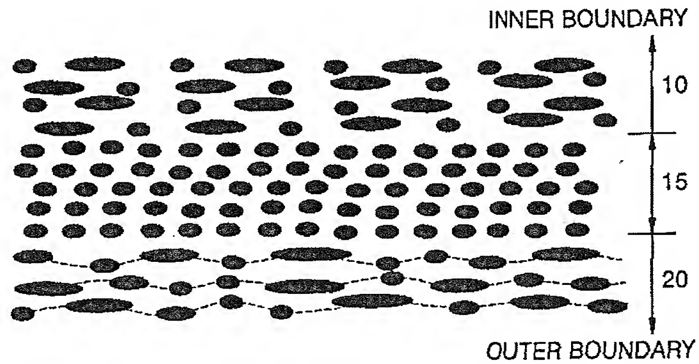
OUTER BOUNDARY

FIG. 6A


INNER BOUNDARY
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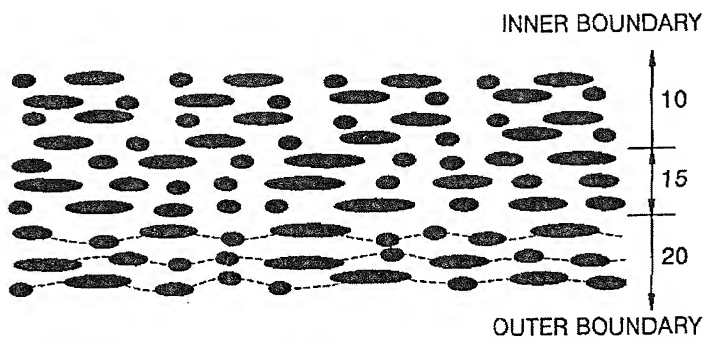
OUTER BOUNDARY

FIG. 6B


INNER BOUNDARY
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OUTER BOUNDARY

FIG. 6C

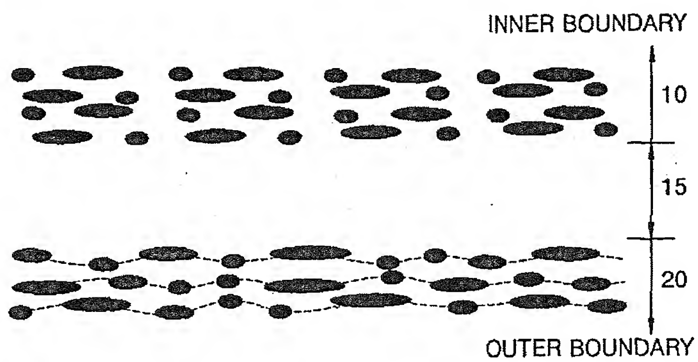
INNER BOUNDARY
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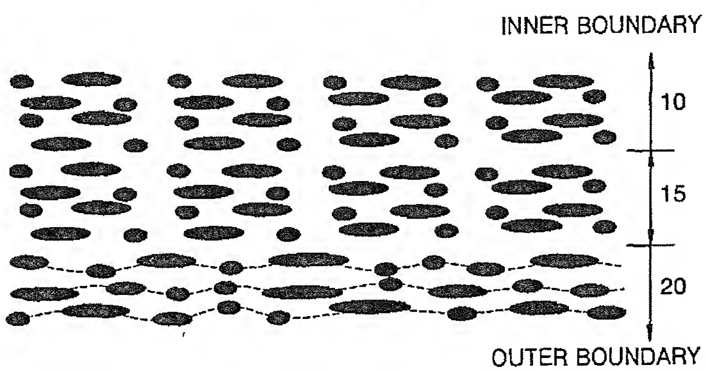
FIG. 6D


INNER BOUNDARY
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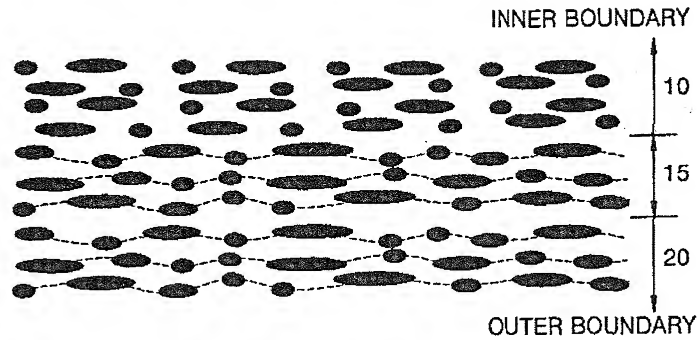
OUTER BOUNDARY

FIG. 6E


INNER BOUNDARY
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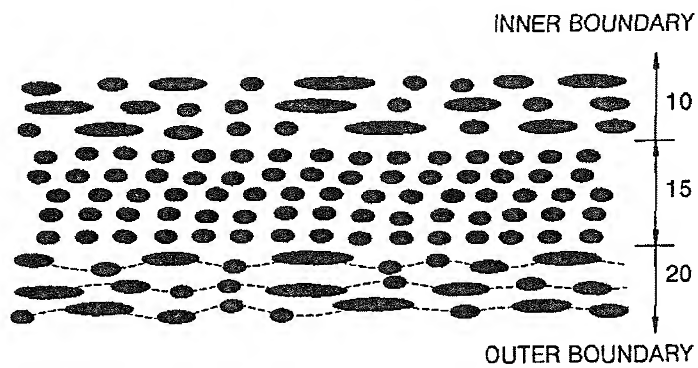
OUTER BOUNDARY

FIG. 7A


INNER BOUNDARY
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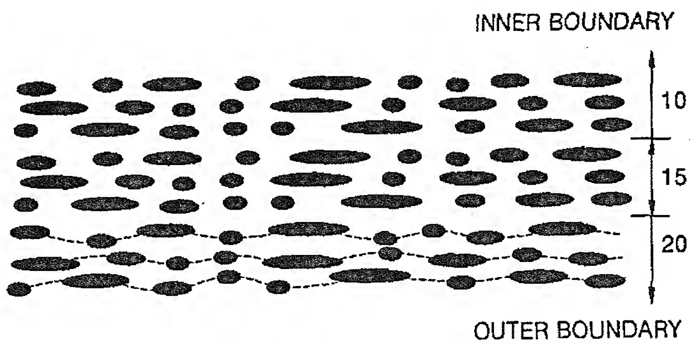
OUTER BOUNDARY

FIG. 7B


INNER BOUNDARY
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OUTER BOUNDARY

FIG. 7C

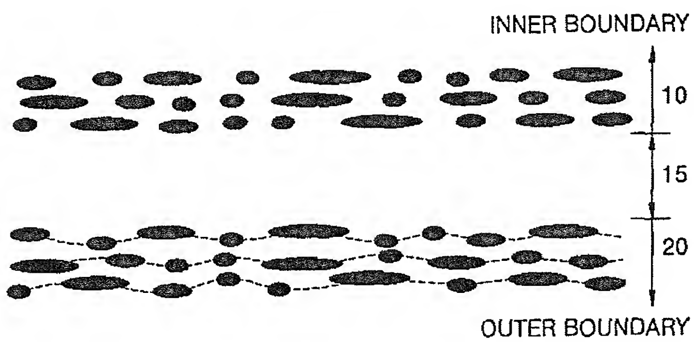
INNER BOUNDARY
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FIG. 7D

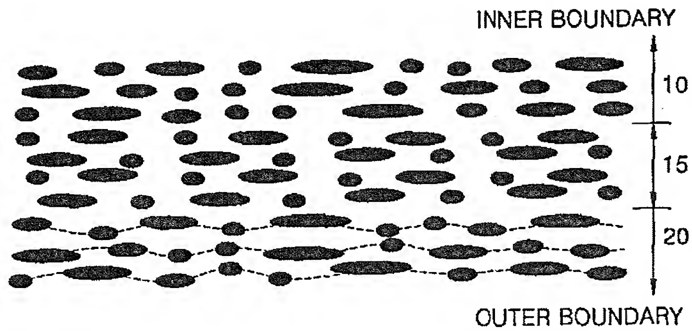
INNER BOUNDARY
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FIG. 7E

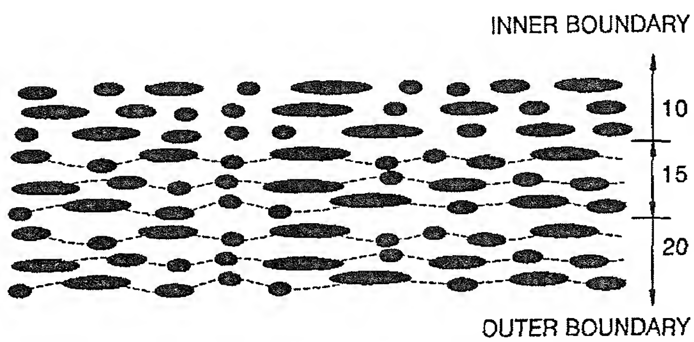
INNER BOUNDARY
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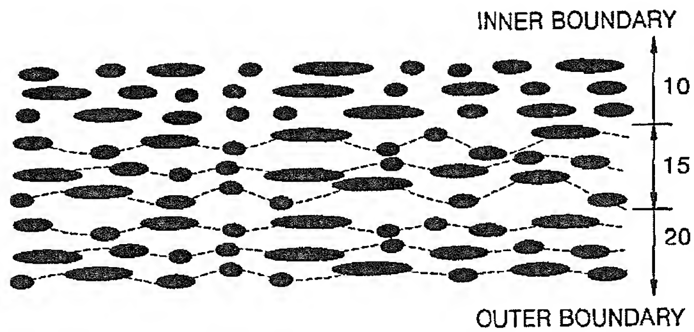
FIG. 7F



INNER BOUNDARY
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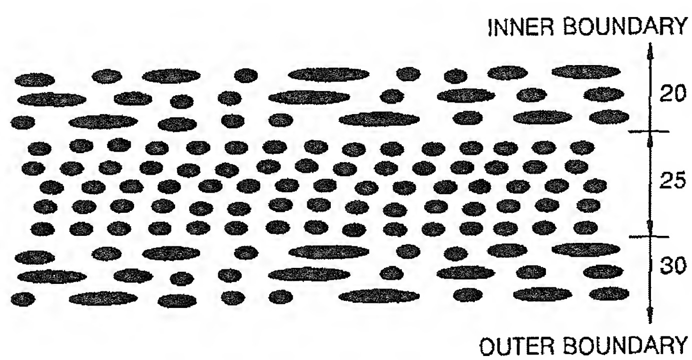
FIG. 8A



INNER BOUNDARY
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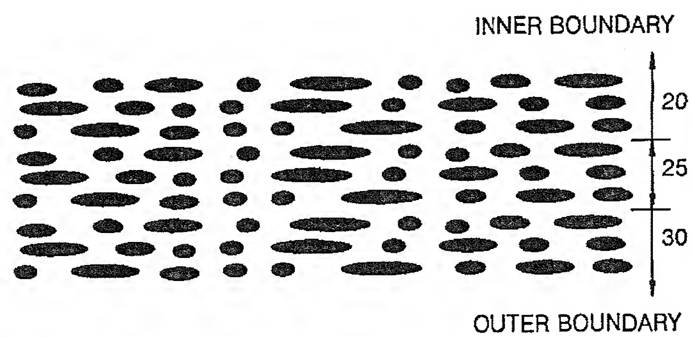
OUTER BOUNDARY

FIG. 8B


INNER BOUNDARY
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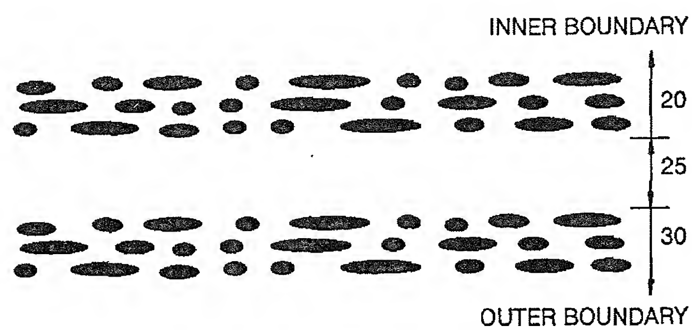
OUTER BOUNDARY

FIG. 8C


INNER BOUNDARY
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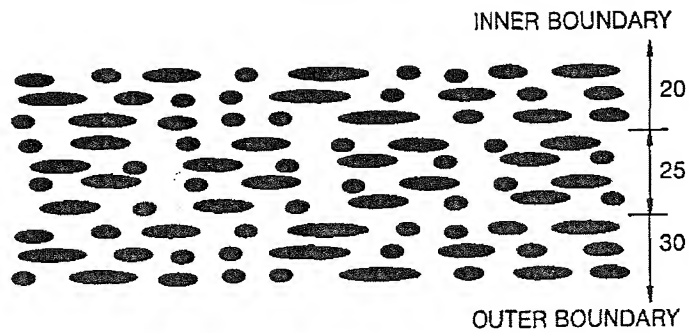
OUTER BOUNDARY

FIG. 8D


INNER BOUNDARY
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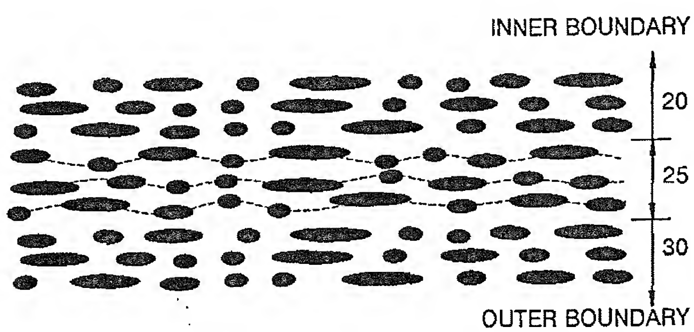
OUTER BOUNDARY

FIG. 8E


INNER BOUNDARY
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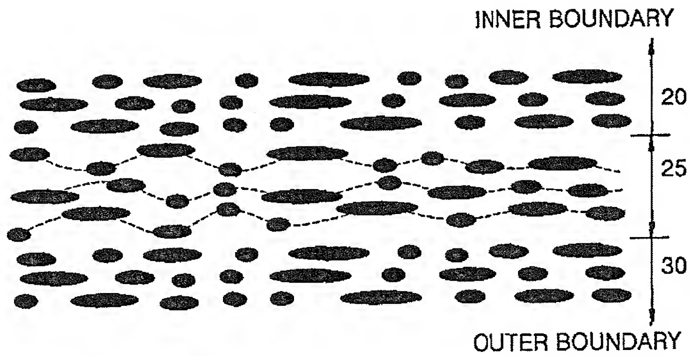
OUTER BOUNDARY

FIG. 8F


INNER BOUNDARY
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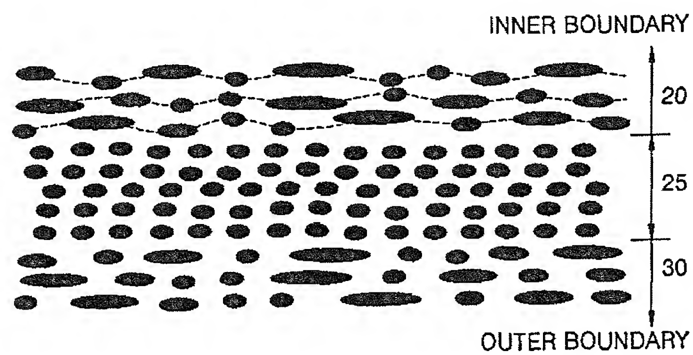
OUTER BOUNDARY

FIG. 9A


INNER BOUNDARY
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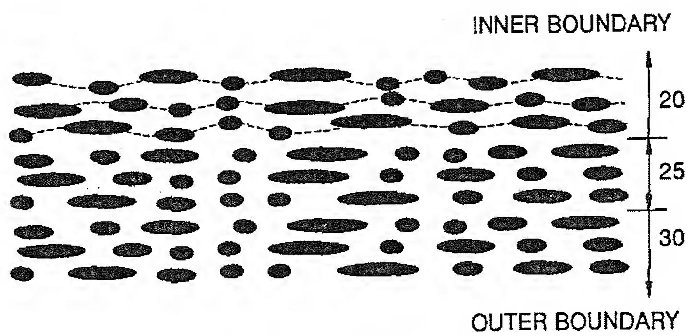
OUTER BOUNDARY

FIG. 9B


INNER BOUNDARY
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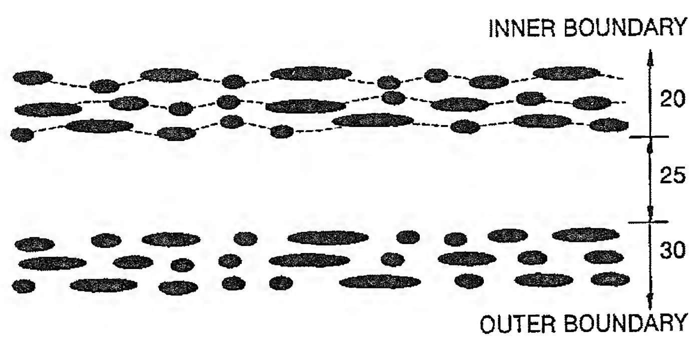
OUTER BOUNDARY

FIG. 9C


INNER BOUNDARY
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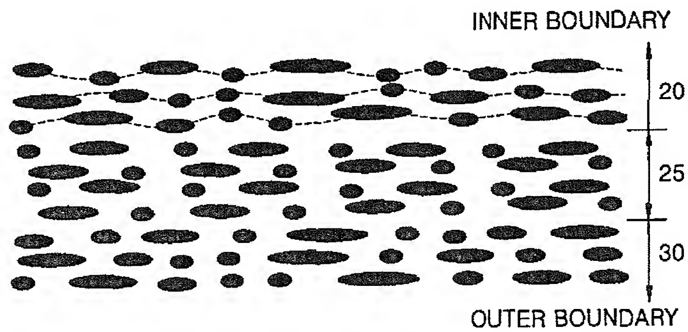
OUTER BOUNDARY

FIG. 9D


INNER BOUNDARY
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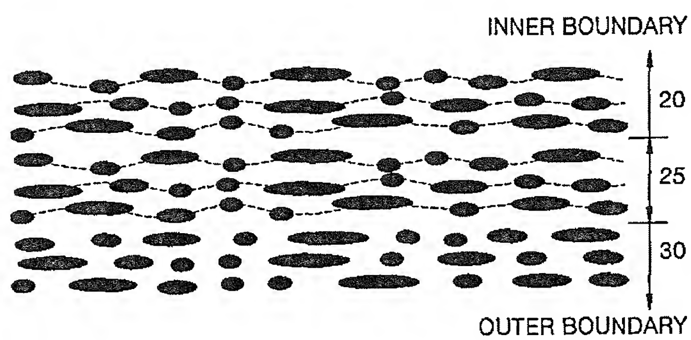
OUTER BOUNDARY

FIG. 9E


INNER BOUNDARY
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OUTER BOUNDARY

FIG. 9F

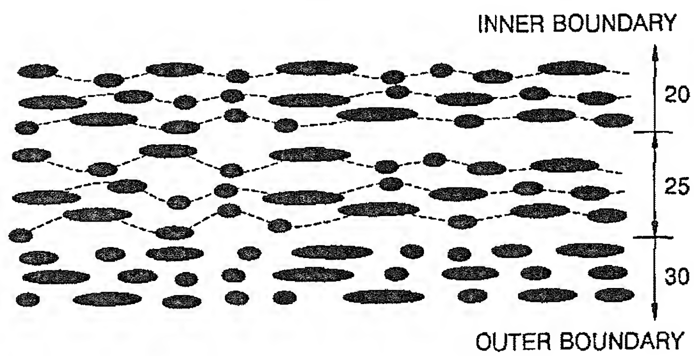



FIG. 10A

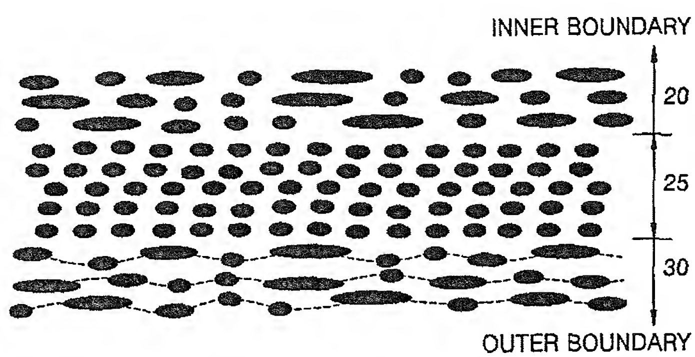


FIG. 10B

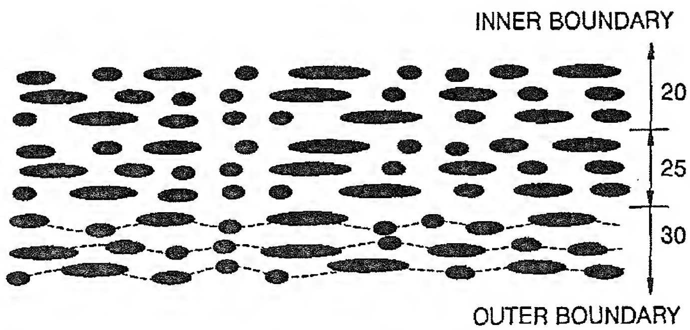
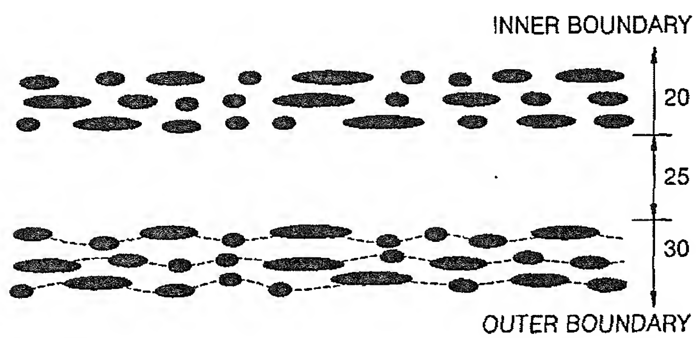
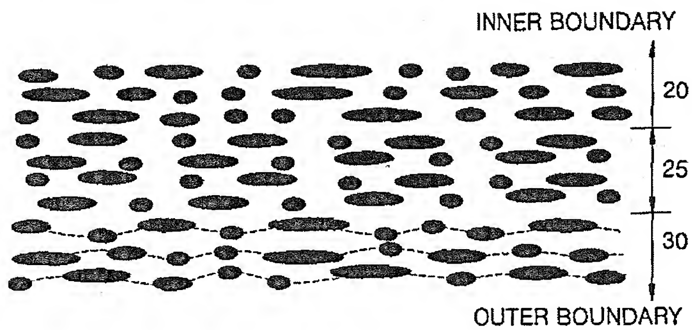



FIG. 10C



# FIG. 10D




# FIG. 10E

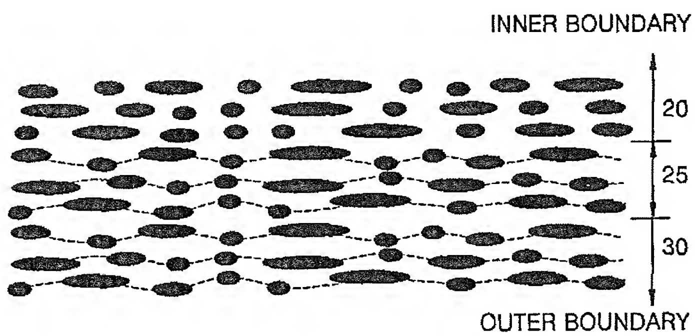


FIG. 10F

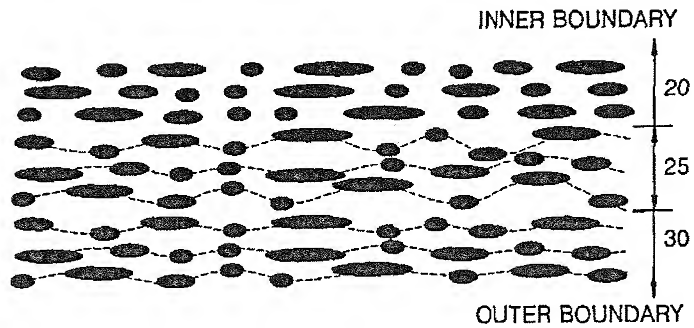



FIG. 11

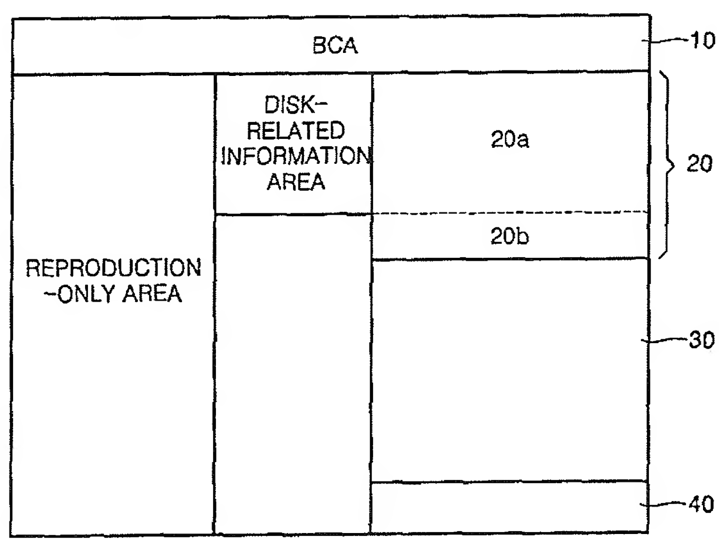


FIG. 12A

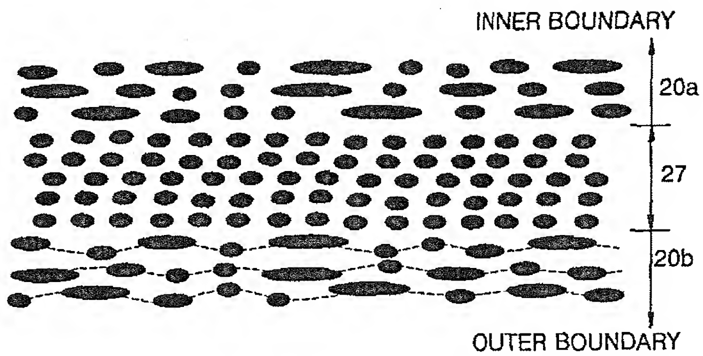



FIG. 12B

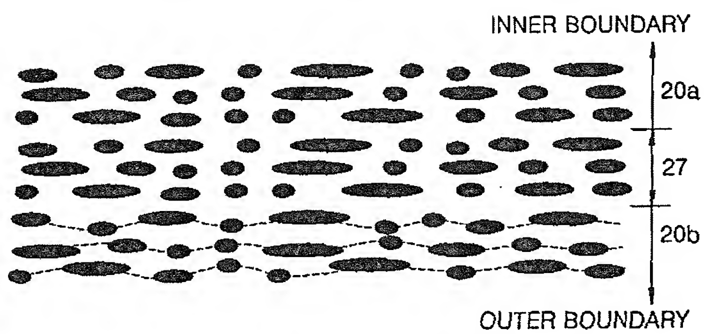


FIG. 12C

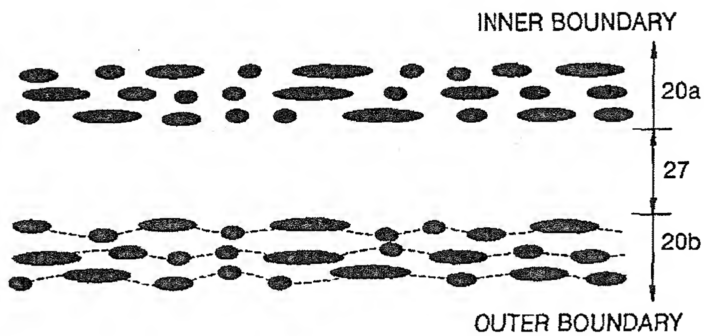



FIG. 12D

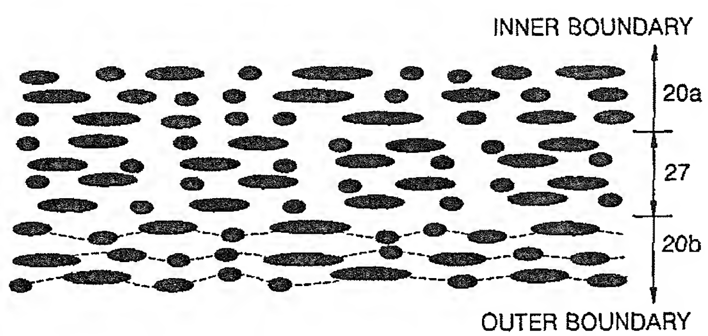


FIG. 12E

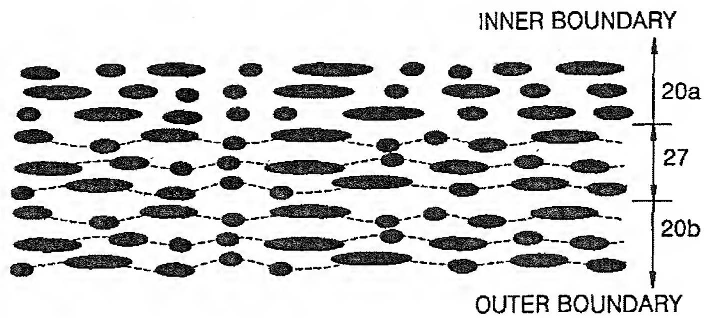



FIG. 12F